

## ABSTRACT

Methods, systems and apparatus for photo-processing of fluids,  
5 particularly complex fluids, such as blood products, pharmaceuticals, injectables and  
vaccines, are provided. The disclosed methods and systems employ non-laser light  
source(s) to generate monochromatic light energy, preferably in the range of 260 nm to  
310 nm, for fluid treatment. Advantageous processing regimens and/or adjunct additives  
and/or agents may also be used to achieve desired and/or enhanced results, e.g.,  
10 inactivation of pathogens, bacteria and/or viruses, modulation of immune response,  
and/or leukoreduction. Particularly preferred embodiments include specific wavelengths,  
novel temperature control systems and geometric/structural arrangements that provide  
enhanced processing results and/or efficiencies. The disclosed methods, systems and  
apparatus achieve desirable results in a broad range of diagnostic, therapeutic and  
15 treatment applications, and generally provide enhanced operating efficiencies and/or  
processing results in application modalities that employ a broad range of photo-activated  
and/or photo-responsive materials and/or compounds.

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